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A LIMITED ANALYSIS AND APPRAISAL
OF THE

MINIFON RECORDER MODEL P-55 L

Report No. 151-B

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ABSTRACT

Environmental temperature tests were conducted on the Minifon Recorder, Model P-55L from $+10^{\circ}$ C in 10 degree steps downward until the unit became inoperative. These tests were conducted to determine the temperature at which the wire transport speed decreased 10% and the temperature at which the wire transport would not turn.

Tests indicated that the recorder will function satisfactorily at -10° C, and that the wire transport speed has dropped 10% of normal at this temperature. The increased friction of the motor and/or wire transport is the limiting factor in cold temperature operation. The motor failed to operate the recorder at -30° C.

Further tests will be conducted on a motor to determine whether the motor or the wire transport is the cause of the reduced speed in cold temperatures. The results of this test will be forwarded at a later date.

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1. INTRODUCTION

The Minifon Recorder Model P-55 L was made in Germany and distributed in the U. S. through Geiss - America, of Chicago, Illinois. The Minifon is a miniature portable wire recorder and play-back amplifier with a self-contained power supply. It is small enough to be carried in an average size coat pocket. Recording capacity is 2-1/2 hours on a single spool of wire.

This paper presents the results of a modified Class B analysis and appraisal and the conclusions based on the recorded data.

2. GENERAL DESCRIPTION

The Minifon Recorder Model P-55 L is contained in a light weight metal case approximately 7" x 4" x 1-5/8" and weighs approximately 2 pounds including batteries and accessories. The case is painted a cream color that gives the unit the appearance of being covered with leather. The top of the case is hinged at the rear which permits access to the wire transport and batteries. Accessories accompanying the unit are a crystal microphone with cord and miniature plug, and a telex type headphone with cord and miniature plug.

Four recessed keyboard type controls, located on the front of the case, are marked Stop, Rewind, Play-back, and Record. A volume control, located to the left of the stop control, is not recessed. A recording time indicator and a motor battery condition indicator are also located on the front.

The amplifier is a 3 stage subminiature tube type. The input and output impedances of the recorder are high. One 10.5 volt motor battery, one 30 volt amplifier plate battery, and a 1.5 volt filament battery are housed within the case.

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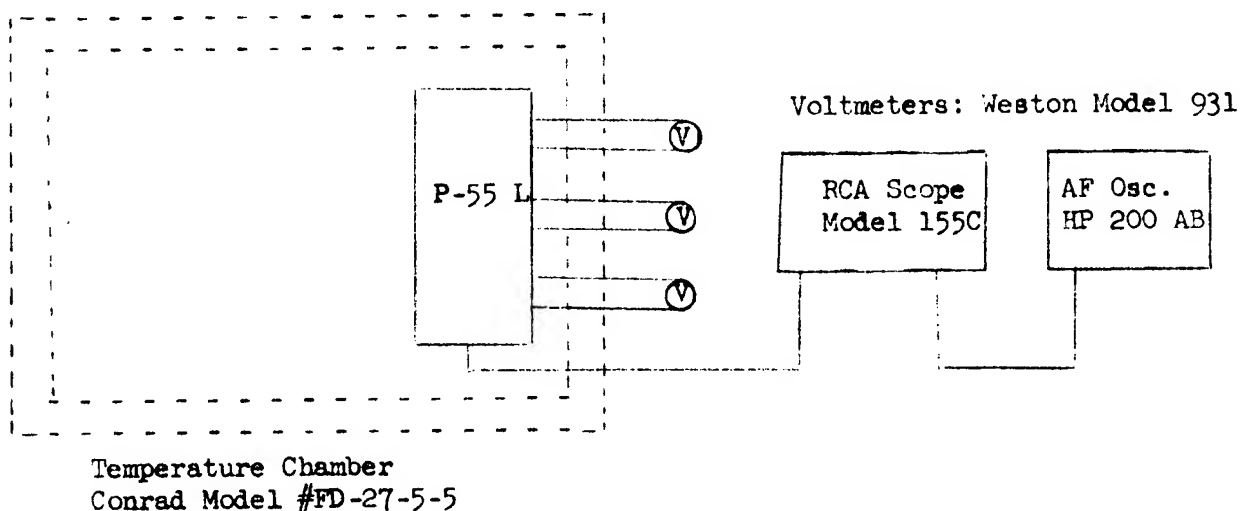
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3. DETAILS OF TEST DATA

3.1. Temperature Test of Recorder Using Internal Batteries

A 1000 cycle audio note was recorded on the Minifon recorder for one hour at approximately $+24^{\circ}$ C.

3.1.1. Test Setup



3.1.2. Method

The Minifon was placed within the temperature chamber and the environmental temperature was decreased to $+10^{\circ}$ C. The Minifon was allowed to remain in the environmental temperature for one hour before the readings were made. The motor battery voltage, the amplifier plate battery voltage and the filament battery voltage were measured and recorded. The Minifon was placed in the "play-back" position and allowed to operate for 5 minutes while the 1000 cycle tone previously recorded was measured to determine any difference in frequency. The environmental temperature was decreased in steps of 10° C, and the above procedures followed until the motor failed to operate. The data recorded at $+24^{\circ}$ C is presented for comparison purposes.

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3.1.3. Result

Temp. °C	Motor Bat. Voltage (V)	Amplifier Bat. Voltage (V)	Filament Bat. Voltage (V)	Frequency of Playback Output (cps)
+24	10.2	30.0	1.46	990
+10	9.2	29.8	1.35	990
0	9.0	29.6	1.30	950
-10	7.4	29.6	1.20	900
-20	5.8	29.0	1.20	420
-30	4.2	29.0	1.20	*

* Motor failed to operate. A new motor battery at room temperature (approximately +24° C) was substituted and the motor still failed to operate.

3.2. Temperature Test of Recorder Only

3.2.1. Test Setup

The test setup is identical to the previous test except that the batteries were removed from the unit and placed outside the temperature chamber.

3.2.2. Method

The method of test is identical to that of the previous test except that the motor battery current, the rpm of the wire transport, and the amplitude of the play-back signal were monitored in addition to the battery voltages and frequency.

3.2.3. Results

The recorded data are presented on the following page.

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3.2.4. Results of Temperature Test of Recorder Only

Temp. in ° C	Motor Bat. Voltage (V)	Amplifier Plate Bat. Voltage (V)	Filament Bat. Voltage (V)	Frequency in Cycles/Sec.	%Decrease in Playback Amplitude	RPM of Transport	Motor Bat. Current (MA)
+24	10.2	30.2	1.56	995	None	112	60
+10	9.8	30.2	1.56	990	None	95	70
0	9.5	30.0	1.53	990	5	90	35
-10	9.2	30.0	1.50	990	10	90	115
-20	8.7	30.0	1.50	890	40	83	175
-30	8.2	30.0	1.50	*	100	36	230

* No measurable output.

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4. CONCLUSIONS

Satisfactory operation of the P-55 L may be expected at temperatures as low as -10° C without exceeding the specified 10% reduction in wire transport speed.

The behavior of the Minifon Recorder as the temperature is decreased indicates that the friction of the motor and/or the tape transport are the limiting factors in cold temperature operation. The motor current drain at -10° C is approximately twice that measured at $+24^{\circ}$ C. Under these conditions it is possible that the motor may burn up; however, this unit performed satisfactorily for approximately eighteen minutes without mishap. It is presumed that the additional heat is dissipated without difficulty at -10° C.

Reduced output from all batteries must be expected below 0° C; however, the decrease in motor battery output is the most critical. The current drain from the amplifier plate and filament batteries is low in comparison to that of the motor battery and therefore, it is predicted that both these batteries will perform without difficulty as long as the motor battery is useable.

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